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Borealis Polymers Oy

CLAIMS:

1. A process for producing a particulate support for an olefin polymerisation catalyst, wherein a solution of a magnesium compound is contacted with a solution of an element of Group 13 or 14 of the Periodic Table (IUPAC) to obtain a solid reaction product, characterised in that the solid reaction product is formed by
   (i) contacting (a) a solution of a magnesium hydrocarbyloxy compound with (b) a solution of a halogen-containing compound of an element of Group 13 or 14 of the Periodic Table (IUPAC); and
   (ii) recovering the solidified reaction product from the reaction mixture by separating the solid product from the liquid reaction medium and/or by washing the product to adjust the molar ratio of the element of Group 13 or 14 of the Periodic Table to magnesium in the obtained reaction product material to a value of at least 0.3, preferably of at least 0.4.

2. A process of claim 1, wherein the magnesium hydrocarbyloxy compound is of formula (I): $Mg(OR_1)_{2-n}(R_1)_nX_x$ (I), wherein each R_1 independently represents a C_{1-20} hydrocarbyl group; X is a halogen; $0 \leq n < 2$ and may or may not be an integer; $x < 2$ and may or may not be an integer; the sum of (2-n), n and x is 2.

3. A process according to claim 1, wherein the molar ratio is adjusted to 0.4 ≤ (halogen-containing compound of an element of Group 13 or 14):Mg ≤ 1.1, and preferably to 0.6 ≤ (halogen-containing compound of an element of Group 13 or 14):Mg ≤ 0.99.

4. A process according to claim 1, 2 or 3, wherein said molar ratio is adjusted by washing the obtained reaction product with a wash solution.

5. A process according to any one of claims 1 to 4, wherein the wash solution is an inert hydrocarbon selected from a linear or branched aliphatic, alicyclic or aromatic C_{5-20} hydrocarbon or any mixtures thereof, and, optionally, the washing step is carried out in a temperature between 40 to 80 °C.

6. A process according to any one of claims 1 to 5, wherein (a) the solution of a magnesium hydrocarbyloxy compound is added to (b) a solution of a halogen-containing compound of Group 13 or 14 of the Periodic Table to obtain the solid reaction product.

7. A process according to any one of claims 1 to 6, wherein the halogen-containing compound of Group 13 or 14 of the Periodic Table is a chlorine-containing compound of Group 13 of the Periodic Table.

8. A process according to any one of claims 1 to 7, wherein the chlorine-containing compound of Group 13 of the Periodic Table is a compound of formula $Al(R_1)_xX_{3-x}$ (II), wherein each R_1 independently represents a C_{1-20} hydrocarbyl group; X is chloride and $0 \leq x < 3$.

9. A process according to any one of claim 1 to 8, wherein the compound of formula (II) is ethylaluminium dichloride.

10. A process according to any one of claims 1 to 9, wherein the magnesium hydrocarbyloxy compound is of formula (I): $Mg(OR_1)_{2-n}(R_1)_nX_x$ (I), wherein $0 \leq n < 2$ and may or may not be an integer; each X and R_1 are independently as defined in claim 2; and x is 0.

11. A process according to any one of claims 1 to 10, wherein the solution of the magnesium hydrocarbyl oxy compound (I) is a reaction mixture prepared by contacting in an inert hydrocarbon solvent or any mixtures thereof a magnesium alkyl of formula $Mg(R_1)_2$ (III), wherein each R_1 is independently as defined in claim 2, with an alcohol of formula R_1OH, wherein R_1 is as defined in claim 2, preferably a C_{3-15} cycloalkyl or branched or unbranched C_{3-15} alkyl.

12. A process according to claim 11, wherein the magnesium alkyl compound (III) is butyloctylmagnesium.

13. A process according to claim 11 or 12, wherein the alcohol R_1OH is 2-ethyl-1-hexanol.

14. A process according to any one of claims 12 to 13, wherein butyloctylmagnesium in an inert hydrocarbon solvent or any mixtures thereof is contacted with 2-ethyl-1-hexanol and the obtained solution is added to a solution of ethylaluminium dichloride in an inert

hydrocarbon solvent or any mixtures thereof to form a solid reaction product.

15. A solid catalyst support for an olefin polymerisation catalyst obtainable by a method of any one of claims 1 to 14.

16. A solid catalyst support according to claim 15, wherein the molar ratio of the element of Group 13 or 14 of the Periodic Table (IUPAC) to magnesium in said support is of ≥ 0.3, preferably ≥ 0.4.

17. A solid catalyst support for an olefin polymerisation catalyst comprising a separated and/or washed solid reaction product of (a) a magnesium hydrocarbyloxy compound and (b) a halogen-containing compound of an element of Group 13 or 14 of the Periodic Table (IUPAC, the molar ratio of the element of Group 13 or 14 to magnesium in said support being of ≥ 0.3, preferably ≥ 0.4; and, optionally, of an electron donor.

18. A solid catalyst support according to claim 17, which comprises a separated and/or washed solid reaction product of (a) a reaction mixture of a solution of magnesium alkyl of formula $Mg(R_1)_2$ (III), wherein each R_1 is independently as defined in claim 2, with an alcohol of formula R_1OH, wherein R_1 is as defined in claim 11, in an inert hydrocarbon solvent or any mixtures thereof; and (b) a solution of formula $Al(R_1)_xX_{3-x}$ wherein each R_1 and X and x are as defined in claim 10, in an inert hydrocarbon solvent or any mixtures thereof.

19. A solid catalyst support according to any one of claims 17 to 18, wherein the molar ratio of Al:Mg in said support is ≥ 0.4, preferably $0.6 \leq$ Al:Mg ≤ 0.99.

20. A solid support according to claim 18 or 19, wherein in the alcohol of formula R_1OH, R_1 is a C_{3-15} cycloalkyl or branched or unbranched C_{3-15} alkyl.

21. A process for producing a Ziegler-Natta catalyst component for olefin polymerisation comprising treating, in an inert solvent, a solid catalyst support according to any one of claims 15 to 20, or prepared according to a method of any one of claims 1 to 14, with a transition metal compound of Group 3 to 10 of the Periodic Table (IUPAC), and, optionally, with an electron donor, and then, optionally, recovering the catalyst component.

22. A process according to claim 21, wherein the transition metal compound is a tetravalent titanium compound.

23. A process according to claim 22, wherein the transition metal compound is titanium tetrachloride.

24. A process according to claim 23, wherein $TiCl_4$ is used in a molar ratio of 1 - 0.5 mol to one mol of Mg present in the support.

25. A process for (co)polymerising an olefin using the catalyst component produced according to any one of claims 21 to 24.